Effect of a wheelchair experience for planning students on students' comfort and confidence in performing wheelchair skills: a randomized controlled trial

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INTRODUCTION

Annually since 2014 we have conducted a Wheelchair Experience for Planning Students (WEPS) for the second-year undergraduate students in the Urban Planning Program at Dalhousie University. The WEPS includes two components: 1) learning how to safely and effectively negotiate barriers in a simulated environment in a wheelchair (the "Skill Learning Experience" [SLE]) and 2) trying to negotiate barriers in urban public spaces (the "Real World Experience" [RWE]). Our objective was to test the hypothesis that the WEPS enhances planning students' comfort and confidence in performing a set of wheelchair skills that are relevant to them.

METHODS

The study was approved by the Research Ethics Board of Dalhousie University. Twenty-seven students were randomly assigned to two groups. The SLE group received the SLE first (Table 1, Figure 1) and the RWE (Table 2) about one week later. The order was reversed for the RWE group. A modified version of the Wheelchair Skills Test Questionnaire (WST-Q) Version 5.0 [1] was used for students to rate (0-3) their levels of comfort and confidence in conducting 15 activities. The WST-Q was administered twice (following the first educational experience and following both experiences). Total percentage scores were calculated.

Table 1. Skills Learning Experience (SLE)

#	Skills	Example real-world situations
1	Roll straight forward for a short distance	• Along a short hallway
2	Roll straight backward for a short distance	• Backing away from a table • Stop to avoid people or pets
3	Turning the wheelchair around in a small space	• In an elevator or bathroom
4	Moving turns forward	• Moving among tables at a restaurant
5	Moving turns backward*	• Exiting bathroom stall.
6	Moving the wheelchair sideways*	• To get to the side of the wheelchair next to a kitchen counter or in an elevator.
7	Moving through hinged door*	• Entering and existing a building and rooms; • Using handles with varying resistance
8	Roll longer distance*	• Traveling from parking space to office
9	Moving up and down inclines of different pitches*	• Standard ramp of slope ratio 1:12, or steeper ramps in front of restaurant entry, transit buses
10	Moving on side-slope	• Sidewalks usually having side slope ratio of 1:50 for drainage; steeper where they cross a driveway
11	Moving on soft surface.*	• Carpet, grass, snow • Loose gravel roads
12	Gets over obstacle	• Door threshold
13	Gets over a gap*	• Platform-subway transition, rut in the road
14	Gets up and down a high curb*	• At a street corner without a pedestrian ramp ("curb cut"); minor level changes (e.g. when entering a building)
15	Gets up and down stairs*	• To access a building without a ramp or elevator • Stairs with rise/run variations; different height and styles of railing, different stair widths

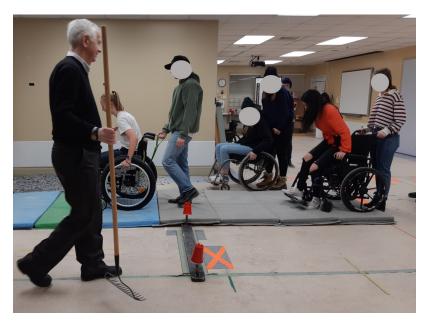* Skills simulated for both wheelchair users and caregivers

Figure 1. The students and spotters performing the soft-surface skill while simulating wheelchair users moving forward on gym mats and simulating caregivers pulling the wheelchairs backwards over gravel. The instructor is holding a rake used to deal with displaced gravel.

Table 2. Real-World Experience (RWE)

#	Setting	Experimentation examples
1	Crosswalks	With a caregiver, travel across crosswalks with and without traffic signals, going off from a sidewalk or boulevard if there is one
2	Building entrances	Use the ramp if there is one Go through manual doors; go through automatic doors
3	Bench in the park	Approach the bench Transfer from wheelchair to the bench
4	Sidewalks	Travel for a block and feel the slope changes Maneuver around obstacles Observe frequency of encountering obstacles
5	Street parking	Try to pay the pay parking Pretend coming out of the car and transfer to the sidewalk

RESULTS

The results are shown in Table 3. The mean total (SD) scores on the first WST-Q were 32.1% (9.2) for the SLE group and 26.3% (11.0) for the RWE group (p=0.17). For the second WST-Q, the total scores were 40.0% (8.5) and 38.3% (9.9) respectively (p=0.65). The total WST-Q scores significantly improved between the first and second time points for both the SLE (p = 0.009) and RWE (p <0.0001) groups. The extent of improvement was not significantly different between the groups (p = 0.19). However, the students' comments generally favored having the SLE precede the RWE.

Table 3: WST-Q scores by group and time

Total (n=27)	WST-Q at T1 mean (SD) scores	WST-Q at T2 mean (SD) scores	Change (T2-T1) (SD) scores and p values
SLE (n=10)	32.1 (9.2)	40.0 (8.5)	7.9 (7.6) p=0.009*
RWE (n-17)	26.3 (11.0)	38.3 (9.9)	12.0 (7.8) p<0.0001*
P value	p=0.17	p=0.65	p=0.19

* Statistically significant ($p < 0.05$)

DISCUSSION

The WEPS significantly enhances planning students' comfort and confidence in performing a set of wheelchair skills that are relevant to them.

REFERENCES

[1] Wheelchair Skills Program [WSP] (July 2020). Wheelchair Skills Test (WST) 5.0 Form – Manual Chair. https://wheelchairskillsprogram.ca/en/skills-manual-forms/